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benders which attempt to eat the eggs. The male himself eats some of the eggs, but on account of the slowness of his digestion is unable to eat more than a small proportion, hence his presence is in the main protective. In defending the eggs the male is merely guarding his own food-supply; the origin of the brooding habit in this case seems to be the feeding habit. The eggs hatch about six weeks after fertilization. The newly hatched larva is about 25 mm. long, and has a large yolk sac. Larvæ kept in the laboratory for two months after hatching retain a remnant of the yolk sac, and refuse food. Year-old larvæ are 6-7 cm. long, and retain the external gills. Larvæ two years old are about 12 cm. long and the external gills are greatly reduced. Sexual maturity is attained with a length of about 34 cm. and probably requires three or four years.

*Relations between Regeneration, the Degree of Injury, and Moulting in Young Lobsters:* V. E. EMMEL, Brown University.

The phenomena of regeneration and moulting in the lobster present two distinct processes of cellular activities. The one, moulting, is going on more or less continuously throughout the period, or cycle, between moults: the other, regeneration, may be artificially induced at various points within this cycle. The problem is: what influence do these two processes exert upon each other?

A series of experiments were made on fourth stage lobsters to determine—first, the influence of regeneration upon the duration of the moulting cycle, or period between moults; second, the rate of regeneration at different stages of the moulting cycle; and third, the effect of different degrees of injury upon moulting and regeneration. The results obtained seemed clearly to demonstrate the following points:

1. That the effect of regeneration is to retard the process of moulting; and that this effect varies according to the time of mutilation, so that the later the process of regeneration is induced in the moulting cycle, the greater is the duration of the period between moults.

2. That, on the other hand, the rate of regeneration varies also according to the time of mutilation, so that the later the mutilation is made in the cycle, the more rapid is the rate of the ensuing regeneration.

3. That the greater the degree of injury, the slower the rate of regeneration, and the greater the duration of the moulting cycle.

These experiments, therefore, indicate that there is an interaction between the two processes of regeneration and moulting, of such a nature that the introduction of one will disturb the normal activity of the other. Since, also, this interaction varies at different times in the moulting cycle, it emphasizes the importance of taking this factor into account when drawing conclusions from experiments made upon crustacea and other animals which undergo ecdysis.

C. JUDSON HERRICK,  
*Secretary*

#### SCIENTIFIC BOOKS

*L'Attention.* By. W. B. PILLSBURY. Paris: Doin, 1906. 8vo. Pp. 304. Bibliothèque Internationale de Psychologie Experimentale.

A sufficient number of the fifty volumes that are to form this series of handbooks of experimental psychology have appeared to justify the plan of the whole and to demonstrate their serviceability. Professor Pillsbury's volume on the attention is well conceived and well executed; it is so particularly from the point of view of the student, and thus will be a welcome addition to the pedagogical literature when available in English.

It is quite inevitable that such of the topics as are not divided by fairly settled contours of material should largely encroach upon one another's field. Attention can not be considered without equally considering the associative processes, the memory, perception, imagination and the other accepted rubrics of an academic psychology. It is accordingly the attentive side of consciousness, the attentive aspect of the mental moment and the mental movement that is thus singled out for monographic presentation. Professor Pillsbury's presentation and his conclusions alike bring this relation prominently before the reader, and produce the feeling of studying interesting aspects of a natural psychic species, not of a dissected specimen.

The volume falls into two portions; the one concerned with the exposition of the data, the other with their theoretical interpretation. In the former portion the essentially psychological *Leitmotiv* is well maintained, and physiological data (or suppositions) are never allowed to obscure or replace the essential fact that our knowledge of the attentive life is introspectively derived, though exercised upon objectively definite situations and measurably subject to verifiable experimentation. Attention is an expression of the emphasis and selection of the possible stimuli or occupations of consciousness by which the mental movement takes its direction, guides its course and shapes its progress. It brightens and clarifies a portion of the field, creates momentary foci, gives definiteness and contouring to the mental play, converts it from a nebulous monotone to a significant though shifting chiaroscuro. It is not a vague, formal or abstract concept, but is embodied in the mode of action of the nervous system as the mechanism of the mind. It thus has interesting motor accompaniments, that adjust the perceptive mechanism to finer, more discerning service, that quicken the intensity of the mental moment, and reveal their existence in independence or defiance of volition. Attention finds its course determined by all sorts of conditions; yet notably these divide according as they are objectively characteristic (the intensity and accumulative

force of the appeal) or, more influentially, by the subjective factors. These really summarize the entire life history of the race and the individual, his heredity and social heritage, his temperament and naturally his momentary condition of mind and body. Interest is but a gauge, not a creator of attention; and to say that we attend to what is interesting but calls attention to the underlying community of many of these factors. Nor is attention explained by its motor accompaniments and expression. These, like the scope of the attentive searchlight, like the fluctuations under fatigue, reflect its close dependence upon physiological conditions. Attention guides and selects in the sensory as in the intellectual field, and thus becomes an expression of the mental totality or consciousness. It plays a like part in the representative field of memory and association as in the presentative field of sensation and perception; for in truth all these processes shade into one another; and their composite nature characterizes the whole mental life.

On the side of theory the most important issue is the rôle of apperception, whose functional efficiency is recognized by the subjective aspects of the attentive process. The varieties of formulation of the 'apperception' theories are so various and the differences between them so elusive, that the reader will be grateful for Professor Pillsbury's guidance, which includes as well a survey of the historical field. Next in importance is the motor theory of attention; while each of these types and their varieties takes note of—as certain theories exclusively consider—the physiological bases of attention. Professor Pillsbury's view has the merit of merging the points of emphasis of the several explanations and of presenting the attentive process not as an isolated faculty or function, but as an aspect of the totality of the natural mental state.

Reduction of these conclusions to a phrase or an outline is impossible; and the reader must be referred to Professor Pillsbury's brief résumés for a suggestion of the theoretical and controversial aspects of the attention. These, when closely considered, reveal their

intensely academic character; and an adherence to one or another depends upon the bent of one's philosophic allegiance and temper.

JOSEPH JASTROW

*The Value of Pure Water.* By GEORGE C. WHIPPLE. New York: John Wiley & Sons. Pp. 84. Price, \$1.00.

This small publication, which contains much material of both interest and value, is practically a reprint of portions of three earlier papers by the author. One from 'Biological Studies by the Pupils of William Thompson Sedgwick,' another from 'The Pollution of Streams and the Natural Agencies of Purification' and a third on 'The Disadvantages of Hard Water.'

Among the qualities of a public supply which affect the consumer 'temperature' is included. This is well, for that item receives far too little attention from those who forget that the great bulk of the people can not afford the luxury of ice.

As showing the advantages of filtration, a comparison between the typhoid rates in Albany and Troy is striking, but it should be noted that Troy never drew Hudson River water from below the mouth of the polluted Mohawk, and now takes no river water at all. In showing the pecuniary loss to a community due to water-borne typhoid, the author places the 'residual typhoid,' or number of yearly deaths not traceable to water, at a probable value of 20 per 100,000. He adds, however, that this value will doubtless diminish in the future because of a gradual decrease in the number of foci of infection. A good table is given showing the increase in cost to the laundry interests resulting from the use of hard water, and a formula is added whereby may be calculated the depreciation of the money value of a water for soap users because of hardness.

Additional formulæ are given which severally state the depreciation due to 'sanitary quality' to 'temperature' and to 'physical characteristics,' under which latter head are included 'turbidity,' 'color' and 'odor.' Odor is again divided into that due to 'organ-

isms,' to 'decomposition' and to 'vegetable odors.'

This is all well enough, but the resulting complexity of formulæ is somewhat more than the average water purveyor might wish for.

"Habit and association have much to do with a person's views as to the attractiveness of water" is a most true statement, and upon it depends the success with which many an indifferent supply is now offered to the public.

The book is well worth its price and should be found in every water library.

W. P. MASON

*Alcohol—The Sanction for Its Use Scientifically Established and Popularly Expounded by a Physiologist.* Translated from the German of Dr. J. STARKE. New York, G. P. Putnam's Sons. 1907.

This book, written in defense of the use of alcohol, appears at a time when there is a world-wide movement in favor of a stricter temperance. By alcohol the author means the substance as contained in the purer beverages, not such concoctions as absinth which are compared to alcoholic solutions of opium.

The moderate drinker who experiences 'internal mental exaltation with perfectly clear consciousness' has no poisoning of the brain provided it is only occasionally that he gets 'elevated.' The book claims that a medium amount of alcohol is favorable to the performance of muscular work, and a medium allowance is put at 560 c.c. of absolute alcohol or two and three quarter pints of brandy for a man weighing 140 pounds. The author states that caffein constricts the cutaneous blood vessels and enlarges those of the interior, and since alcohol behaves in the opposite manner, therefore rum should be taken in tea and a liqueur after coffee.

While this volume will scarcely meet with unanimous approval, it might still be recommended as an antidote to the attenuated nonsense of the 'scientific temperance' of the school books.

GRAHAM LUSK

#### SCIENTIFIC JOURNALS AND ARTICLES

*The American Museum Journal* for April contains illustrated accounts of the 'Habitat